

## CrIS - List of Changes From Version One, Revision Two (1 March 1999) through Version 2, 8 March 1999

The following is a summary of the changes reflected in these change pages.

- CCBD 98091—1) In the CrIS SRD, **change:** 40.3.5-14 k., l., m., and 15 n **to:** 40.3.5-14j., k., l., and 15 m.
- 2) In the CrIS SRD, the entry (10%/2km layers) in the 40.2.1 Measurement Uncertainty objective column is redundant (and an unnumbered requirement) because measurement uncertainty is broken out by layer beneath that row. **Delete:** "10%/2km layers" from the objective column in CRIS 40.2.1h.. Measurement Uncertainty row.
- 3) In the CrIS SRD, the entry (0.5K) in 40.2.2-25h. Measurement Uncertainty Objectives column is redundant because measurement uncertainty is broken out by layer beneath that row. **Delete:** "0.5K" from the objective column in the CRIS SRD 40.2.2-25 h. Measurement Uncertainty, **move:** "h. Measurement Uncertainty" down one row to a new, un-numbered row and **insert:** "Not used" in row 40.2.2-25.
- 4) **Change:** "and" **to:** "or" in the Thresholds and/or Objectives columns of the following table entries:  
Vertical Moisture Profile, CRIS SRD 40.2.1-9, -10, -11, -12, -13, -14  
Pressure Profile, CRIS SRD 40.3.5-11, -12

CCBD 99020-- The requirement to have a 5 deg solar infringement on the cold side of the spacecraft in the case of a noon or midnight orbit needs to be deleted.

- 1) In Para 3.1.6.3 On-orbit Operational Concept, **change** the second paragraph **From:** "The sun Beta angle,  $\beta$ , is the angle between the solar vector (i.e., the satellite-sun line) and the orbit plane. For instrument thermal design purposes, the range of  $\beta$  for the NPOESS missions is  $\pm 90$  degrees. The satellite will maintain the sun on the appropriate side of the spacecraft to meet the 'all beta' requirement. Sensor suite design will allow for approximately a 5 degree infringement of sun on the cold space side of the spacecraft in the case of a noon or midnight orbit."

**to** "Text deleted."

- 2) Change requirement SRDK3.1.6.3-1 **From:** "The sensor shall be capable of operating under the above defined orbit and beta angle environment."

**to:** "The CrIS instrument design shall be such that data acquisition and necessary calibrations can be completed if the satellite is flown in the above defined orbit with any equatorial node crossing time (ascending or descending)."

- 3) Change the text of requirement SRDK3.1.6.3-2 **From:** "The sensor shall be capable of operating for 21 days (with an objective of 60 days) without additional commands."

**to:** “Deleted.”

4) **Insert** new requirement SRDK3.1.6.3-3 and text as follows: “SRDK3.1.6.3-3 Specified EDR performance shall be obtained for any of the orbits in SRDK3.1.6.3-1, except for the restrictions in SRDK3.1.6.3-4.”

5) **Insert** new requirement SRDK3.1.6.3-4 and text as follows: “SRDK3.1.6.3-4 The satellite shall only be flown in orbits that keep sunlight off of the cold side of the spacecraft. Because of natural variations in the orbit, the 10 minute nodal crossing time constraint, and variations in the solar illumination of the satellite, this will restrict the spacecraft from flying in orbits within about 30 (TBR on satellite contractor) minutes of noon.”

6) After the text in paragraph 3.1.6.3.2 On-Orbit Operations, **Insert** new requirement SRDK3.1.6.3.2-1 and text as follows: “SRDK3.1.6.3.2-1 The sensor shall be capable of operating for up to 21 days (with an objective of 60 days) without additional commands.”

CCBD 99027 --- SRD 3.2.1.1.4-7 & 3.2.1.1.4-8 (ATBD and Research-grade Code)

1) **change** the first sentence in **CRIS SRD 3.2.1.1.4-7**

**from:**

SRDK3.2.1.1.4-7

“The Contractor shall provide an Algorithm Theoretical Basis Document (ATBD) for the assigned set of Primary EDRs.”

**to:**

SRDK3.2.1.1.4-7

“The Contractor shall develop sufficient materials for an Algorithm Theoretical Basis Document (ATBD) for the assigned set of Primary EDRs.”

2) **Change** the first sentence in **CrIS SRD 3.2.1.1.4-8**

**from:**

SRDK3.2.1.1.4-8

“The Contractor shall provide research grade source code implementing the algorithm(s) described in the ATBD that address the primary EDRs.”

**to:**

SRDK3.2.1.1.4-8

“The Contractor shall develop sufficient research grade source code for implementing the algorithm(s) described in the ATBD that address the primary EDRs.”

3) **Change** the last sentence in **CrIS SRD 3.2.1.1.4-8**

**from:**

SRDK3.2.1.1.4-8

“ The scientific algorithms provided by the contractor may be adopted or adapted from existing algorithms, or developed, as needed.”

**to:**

SRDK3.2.1.1.4-8

“ The scientific algorithms developed by the contractor may be adopted or adapted from existing algorithms, or developed, as needed.”

CCBD99028 -- Change the CrIS SRD K40.2.2-3 value for threshold **from** “40 km(TBR)” **to** “48 km (TBR)”.

CCBD99029 -- Change the Atmospheric Value Pressure requirement for K40.3.5-11, Measurement Accuracy at 2-10km **from** “3% (TBR)” **to** “0.5% (TBR)”

CCBD 99030 -- Change the data rate specified in SRDK 3.2.4-4 **from** “...

- a) Low Resolution Stored Mission Data Rate: 1150 kilobits per second (TBR).
  - b) High Resolution Stored and Real-time Data Rate: 1150 kilobits per second (TBR).
  - c) Low Resolution Real-time Data Rate: None” (continued)
- to** “...
- a) Deleted
  - b) High Resolution Data Rate: 1500 kilobits per second.
  - c) Deleted”

CCBD99031 -- Change SRD 3.2.1.30.6

**from** 3.2.1.30.6 FOV Co-registration

SRDK3.2.1.30.6-1

The centroid of the FOV of all detectors with the same nominal FOV location shall fall in a circle with a diameter equal to 3% (TBR) of the geometric FOV. The goal is for spatial areas of the scenes observed by all detectors with the same nominal FOV location to overlap by at least 97% of the area observed by a given detector.

**to:** 3.2.1.30.6 FOV Co-registration

SRDK3.2.1.30.6-1

The centroid of the FOV of all channels within a band and also for each band with the same nominal FOV location shall fall in a circle with a diameter equal to 3% (TBR) of the geometric FOV. The goal is for spatial areas of the scenes observed by all detectors and all channels with the same nominal FOV location to overlap by at least

97% of the area observed by a given detector. In addition, the goal is to insure that chromatic aberrations in the optical system are not so great as to cause more than 3% (TBR) of the desired spectral range to wander outside the responsive area of the respective detector.

CCBD 99032 -- 3.2.1.25.2 Standard Earth Scenes change

**from:** "3.2.1.25.2 Standard Earth Scenes

The NPOESS IPO will provide up to 5 sounder data sets in each of the categories/areas listed below for use in developing sensor designs, and in verifying sensor and algorithm performance. There are 24 areas in all. For each area except polar, there will be day and night categories as well, making the total 44 areas or categories (TBR) of standard data sets. The government will create an additional set of up to 5 sounder data sets in each area/category which will be used by the government to determine sensor design performance and algorithm performance.

| <u>Climate Area</u>             | <u>Spring</u> | <u>Summer</u> | <u>Autumn</u> | <u>Winter</u> | <u>Location<br/>(NW Corner)</u> |
|---------------------------------|---------------|---------------|---------------|---------------|---------------------------------|
| <b>Polar</b>                    |               |               |               |               |                                 |
| Land: Siberia                   |               | X             |               | X             | 70N 103E                        |
| Coast: Point Barrow             |               | X             |               | X             | 72N 159W                        |
| <b>Tropics</b>                  |               |               |               |               |                                 |
| Land: Amazon Basin              |               | X             |               | X             | 5S 65W                          |
| Coast: Cameroon                 |               | X             |               | X             | 5N 8E                           |
| Ocean: E. Pacific               |               | X             |               |               | 8N 120W                         |
| <b>Midlatitudes</b>             |               |               |               |               |                                 |
| Land: W. Urals                  | X             | X             | X             | X             | 56N 56E                         |
| Coast: Olympic Peninsula        | X             | X             | X             | X             | 48N 126W                        |
| Desert: Great Basin             | X             | X             | X             | X             | 41N 118W                        |
| Ocean: Azores                   |               |               |               | X             | 45N 30W                         |
| <b>Alpine:</b> Swiss Alps       |               |               | X             |               | 48N 8E                          |
| <b>Sub-Tropical:</b> Bangladesh |               |               |               | X             | 25N 88E                         |

Sounder data sets will have a Horizontal Spatial Resolution (HSR) of 7.5 km (TBR) and cover an area equal to 10X10 HSRs (TBR). Data sets will provide radiance values for each band requested by the contractor. The number of sounding bands modeled will not exceed 1500. Contractors with more than 1500 bands in their design must select which 1500 bands they desire as standard sounder data sets. After delivery of the initial set of sounding data sets, contractors may request copies of the executable models and the input data sets and commands used to create the soundings if they wish to generate additional data in other channels. Sensor responsivity will be assumed to be a top-hat (TBR), because alternate sensor response functions can be characterized and calibrated out.

Surface background data will be taken from the appropriate EO/IR image data file. Radiance data will be based on ground truth profiles of temperature, water vapor, and ozone, and will be computed with MODTRAN in the EO/IR for bands of  $2\text{ cm}^{-1}$  or more. For EO/IR channels with less than  $2\text{ cm}^{-1}$  bandwidth, FASCODE will be used to compute radiance. The temperature, water vapor, and ozone profiles will be available for each dataset given to the contractor. Cloud/no-cloud masks, at the smallest HSR, will be provided with each sounder dataset. Sounder dataset files will be supplied as binary data in raster format, with a 32 bit floating point value for each pixel, and with 1 band/channel per file (TBR). Files will be supplied on TAR tapes (TBR)."

**to: "3.2.1.25.2 Standard Earth Scenes**

The NPOESS IPO shall provide sounder data sets for use by the Contractor in evaluating sensor designs, and in verifying sensor suite and algorithm performance. The government will create an additional set of sounder data with the intent to conduct a "blind test" performed by the Contractor. If available, these blind test results will be briefed to the Government either prior to or at PDR (at the Contractor's discretion). The sounder data sets will consist, as a minimum, of the following items:

- 1) NOAA 88 atmospheric profiles data set
- 2) OPTRAN microwave Rapid Transmittance Algorithm
- 3) CrIS Weather Products Test Bed Rapid Transmittance Algorithm
- 4) AIRS one-orbit data set
- 5) Blind Test Set"

**CCBD 99033 -**

- 1) K40.2.1-6, Horizontal Coverage, change the threshold requirement **from** "Global" **to** "N/A\*".
- 2) K40.2.1-6, Horizontal Coverage, change the objective requirement **from** "Global" **to** "N/A\*".
- 3) K40.2.1-16, Minimum Ground Swath-width, **Add** "See \*" to the threshold requirement.
- 4) K40.2.2-22, Horizontal Coverage, change the threshold requirement **from** "Global" **to** "N/A\*\*".
- 5) K40.2.2-22, Horizontal Coverage, change the objective requirement **from** "Global" **to** "N/A\*\*".
- 6) K40.2.2-36, Minimum Ground Swath-width, **Add** "See \*\*\*" to the threshold requirement.

- 7) K40.3.5-7, Horizontal Coverage, change the threshold requirement **from** “Global” **to** “N/A\*”.
- 8) K40.3.5-7, Horizontal Coverage, change the objective requirement **from** “Global” **to** “N/A\*”.
- 9) K40.3.5-15, Minimum Ground Swath-width, **Add** “See \*” to the threshold requirement.
- 10) Below each of the tables, **add** the following footnote: “\* Horizontal Coverage is a system level specification determined by the number of satellites, orbitology, and sensor swath width. Thus, only “Minimum Ground Swath-width” is specified at the sensor level.”

CCBD 99034 - After the end of the first sentence “...MW CrIMSS sensors”, **Add:**

“The Contractor must specify the conditions under which the requirement to deliver an EDR meeting data content and quality requirements will not be met, regardless of whether it is “clear” or “cloudy”. The contractor must also specify the conditions under which it would recommend delivering an EDR which is incomplete and/or degraded but which is still of potential utility to one or more users.

The following paragraphs provide supplementary clarification to the primary EDR requirements listed in this section:

#### **Horizontal Cell Size:**

A measure of the area over which a cloud free sounding is averaged, and may be represented as its square root. [The intent being that within the context of clear and cloudy profiling situations, the minimally acceptable cell size is the associated sensor Instantaneous Field of Regard (IFOR); with the implied goal being a retrieval performed at the highest resolution sensor Instantaneous Field of View (IFOV) practical.] When the IFOV is cloud-free, profiles with HCS no worse than stated SRD threshold values are expected.

#### **Horizontal Reporting Interval:**

In the case of the CrIS SRD EDR requirements, the objective for HRI is that which would result from one sounding per CrIS Instantaneous Field of View (IFOV). The threshold for HRI is that which would result from one sounding report per Instantaneous Field of Regard (IFOR). Depending on cloud conditions, sounding HRIs may range from one per IFOV in cloud free to one per IFOR in extremely (>50%) cloudy conditions. This reporting interval will naturally increase from nadir to edge of scan.

#### **Vertical Cell Size:**

The vertical distance over which the accuracy of the average value of the profile/parameter must meet associated EDR measurement uncertainty requirements [as listed in appropriate EDR performance tables in this section].

**Vertical Reporting Interval:**

The distance between reports, where each report represents values at discrete points. There must be at least 4 reports available [at a minimum] to construct an average value of the profile over the vertical cell size up to 1 mb.”

Included CCBDs Since Version 1, Revision Two (1 March 1999)

|  | Page(s)    |
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| CCBD 98091 CrIS Threshold & Objective description & parameter changes          | 18         |
| CCBD 99020 CrIS Beta Angle   | 14, 15     |
| CCBD 99027 SRD 3.2.1.1.4-7 & 3.2.1.1.4-8 (ATBD and Research-grade Code)        | 25         |
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